INFANT FEEDING

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INFANT FEEDING

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INTRODUCTION

A great deal of information is now available on the advantages of breastfeeding in promoting adequate growth of the baby and in protecting the body from infections. Fortunately, the vast majority of Indian mothers do breastfeed their babies, with the result that growth is good and infections far fewer. However, after about four to six months growth slows down, primarily because of the late introduction of semi-solids in the diet. There is widespread ignorance about the baby's nutritional requirements and the common foods that supply the necessary nutrients. Most mothers *and* health workers are ignorant of how much food a child needs for adequate growth and nutrition. Often the foods suggested are too expensive and beyond the reach of the community; often only liquids are advised in the mistaken belief that the child cannot digest semi-solids.

The main purpose of this book is to emphasise the fact that the child can be adequately fed with common, readily available household foods, provided he is fed enough of the same. I hope this book will help health workers, mothers *and* their families ensure the better health and nutrition of young children.

Throughout the book the baby is referred to in the masculine gender. This by no means suggests the preferential treatment of the male child. It is merely a convenient form of reference to a child of either sex. Besides, it helps avoid the use of the rather cumbersome style of reference—i.e., his/her, he/she—which can be very disturbing while reading.

BREASTFEEDING

The practice of breastfeeding is almost universal in India, except among the urban educated women and the high socio-economic groups, even though they too are now beginning to appreciate the advantages of breastfeeding. Most rural mothers regard this as a natural method of feeding because they see others around them doing the same. They do not even consider an alternative to breastfeeding. We have to take care, however, that this practice is not eroded in any way by socio-cultural developments in rural areas. The increasing use of the bottle by the urban slum dwellers, for instance, has disastrous results for the baby, because the mother's knowledge regarding feeding, environmental sanitation and hygiene is poor. Anything less than exclusive breastfeeding for the first four months of a child's life greatly increases the chance of infection and death, even among children of the well-to-do.

The reasons for discontinuing breastfeeding in favour of bottle feeding are usually unsound and based on wrong premises. If you ask women why they give up breastfeeding, or why they introduce supplements early, they cite many different reasons, such as, 'I did not have enough milk', or,'the baby refused to suck'. The truth is that in most cases these women do not lack milk—they lack the confidence that their milk is by itself enough for the baby, and knowledge of how to improve milk output.

In traditional society there were always experienced women within the family or community to help a new young mother—her mother, aunt, mother-in-law or a neighbour. Fortunately, this still holds true in rural areas. But in modern society, especially in towns, where nuclear families have replaced the extended family, there is often no such help available.

A woman with her first baby might not be sure of how to put him to the breast. Putting the baby to the breast is very simple when you know what to do. But if the baby does not take the nipple into his mouth correctly, it can create several problems which might lead an inexperienced mother to mistakenly give up trying in frustration.

To breastfeed successfully, a woman must feel confident. This means that she must *believe* that she can

do it. However, being inexperienced, she often goes by what others tell her to do. Therefore, she needs advice and support from friends and relatives who have themselves successfully breastfed their babies. Her husband's support and understanding can also be of great help.

Most women work for long hours both within and outside the home. They are tired and often may not have the time and energy to devote to breastfeeding. However, it is important to remember that breastfeeding is far simpler and less exhausting than artificial feeding, if it is done properly.

The help and encouragement of health workers is essential. They must give consistent and up-to-date advice. However, many health workers have themselves bottle fed their babies because of the demands of their job, as also incorrect information and knowledge which convinces them that bottle feeding is as good as breastfeeding.

The Advantages of Breastfeeding

1. It is the simplest way to feed the baby. Safe, warm, clean bacteria-free milk is available all the time, and the mother need not worry about how much milk the baby is getting as long as he is happy and is gaining weight. It is easily utilised and digested by the baby.

2. Breastmilk costs nothing. This is not strictly true if one takes into account the cost of extra family food that the lactating mother requires, but it is certainly much cheaper than substitutes. The extra food will also help improve the nutritional status of the mother. It is estimated that the cost of artificial feeding may be as much as one-third of the total family income for a poor family.

3. Breastmilk is readily available at all times and does not need any preparation.

4. The mother experiences a feeling of satisfaction and achievement which affects her psychologically and makes her and her baby happier. She hugs and cuddles her baby several times a day while feeding and gets to know her baby better. This in turn results in better lactation. Very often the breast starts dripping with milk when the mother holds the baby, a sign of her mental and emotional stimulation transmitted to the breast.

5. Breastfeeding increases the period of lactation amenorrhoea after delivery, which in turn helps postpone the next pregnancy by increasing spacing between one child and the next.

The Composition of Breastmilk

Breastmilk has all the nutrients that a baby needs for the first four to six months of life.

- It contains the most suitable proteins and fat for a baby and in the right quantities.
- It contains more lactose (milk sugar) than milk from any other source, which is what a human baby needs.
- It contains water-soluble vitamin D, besides the fat-soluble fraction which protects against rickets. It also contains more vitamins A, C and E than does cow's milk. The breastfed baby does not require any vitamin supplements and does not need fruit juice.
- Iron in breastmilk is better absorbed than iron in cow's milk.
- It contains enough water for the baby, even in a hot climate, with the result that a breastfed baby does not need to drink any extra water.
- It contains the correct amount of salt, calcium and phosphate.
- Breastmilk is quickly digested because of a special enzyme, lipase, which digests fat.

The composition of breastmilk is ideally suited to the requirements of the baby. A breastfed baby does not need to drink any extra water, even in hot weather.

How Breastmilk Protects against Infections

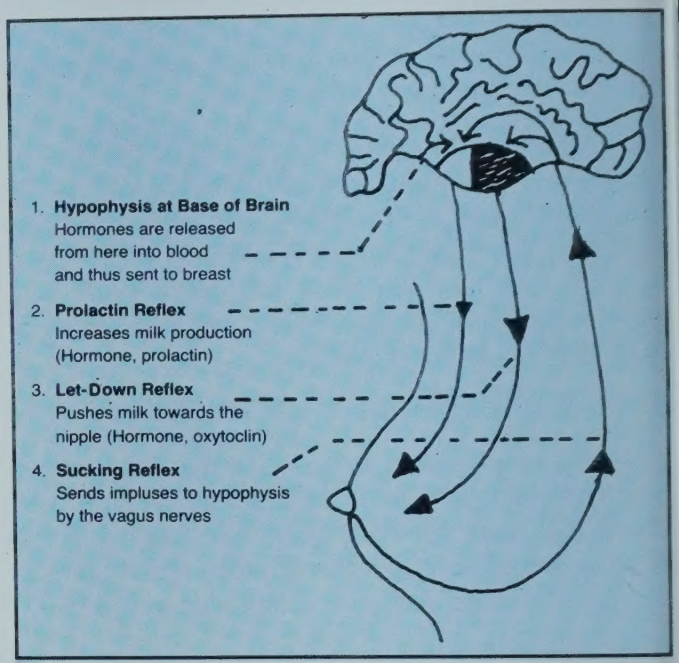
Breastfed babies, as opposed to artificially-fed babies, suffer much less from diarrhoea and have fewer respiratory infections. Thus, they are less likely to die than bottle-fed babies.

- Breastmilk contains antibodies (immunoglobulins) to combat many common infections.
- It contains live cells and lysozomes, which protect against infections. It also contains an antiviral substance, interferon.
- It contains a substance called the bifidus factor which helps special bacteria called *Lactobacillus bifidus* to grow in the baby's intestine and prevent harmful bacteria such as *E. coli* from growing and causing diarrhoea.
- Lactoferrin in breastmilk binds free iron which prevents the growth of harmful bacteria, yet allows the iron to be absorbed by the baby.
- Breastfed babies are less likely to get colic, infantile allergies and eczema than artificially-fed babies.

Breastmilk has several substances which protect the baby against diarrhoea and other infections.

The Anatomy of the Breast

The breast consists partly of gland tissue and partly of supporting tissue and fat. The gland tissue produces the milk which goes towards the nipple along small ducts. Before the ducts reach the nipple they become wider and form lactiferous sinuses. Around the nipple there is a circle of dark skin called the areola, beneath which are the lactiferous sinuses.


1. Hypophysis at Base of Brain
Hormones are released from here into blood and thus sent to breast
2. Prolactin Reflex
Increases milk production (Hormone, prolactin)
3. Let-Down Reflex
Pushes milk towards the nipple (Hormone, oxytoclin)
4. Sucking Reflex
Sends impluses to hypophysis by the vagus nerves

Physiology of Breastfeeding

When the baby begins to feed, two reflexes make the milk come in the right quantity and at the right time.

1. Milk Production Reflex

Every time the baby sucks at the breast, he stimulates the nerve endings in the nipple. These nerves carry messages to the anterior part of the pituitary gland which is situated at the base of the brain. The pituitary gland produces a hormone called prolactin which stimulates the breast to secrete milk. Prolactin

also helps to stop the ovaries from releasing eggs, as a result of which breastfeeding delays the return of menstruation and fertility.

It is very important to understand the effect of sucking on milk production. The more the baby sucks the more milk the breasts produce. If he stops sucking completely, or if he never starts, the breasts stop making milk. The breasts will make extra milk in the case of twins or a large hungry baby. This is called the law of supply and demand—the breasts supply as much milk as the baby demands. If a mother wishes to increase her milk supply, the best way is to encourage the baby to suck longer and more often. Any supplement given to the child will reduce sucking time and the output of breastmilk will fall.

2. The Let Down Reflex, Milk Ejection Reflex, or the Oxytocin Reflex

Oxytocin is produced by the posterior part of the pituitary gland as a result of the baby's sucking. Oxytocin makes the muscle cells around the alveoli contract, after which the milk is pushed down towards the nipple. Oxytocin also makes the uterus contract, which helps to deliver the placenta and stop bleeding after delivery. Therefore, breastfeeding should be started as soon after delivery as possible.

The baby's sucking makes the breast produce milk. The more he sucks the more milk is secreted.

Helping Milk Ejection

If a mother thinks lovingly of her baby or hears him cry, her pituitary gland starts producing oxytocin. She feels a tingling sensation in her breasts and some milk may flow out. Her breasts are ready to feed the baby.

Hindering Milk Ejection

Some situations can work against milk ejection.

- If the mother is worried, afraid, or lacks confidence.
- If breastfeeding is painful.
- If she is embarrassed.

Therefore, it is important to see that the nursing mother is comfortable, relaxed and unhurried, and that breastfeeding is not a painful experience.

How Milk 'Comes In'

For the first two to three days after delivery the breasts feel empty and produce only small amounts of colostrum. Following this the breasts begin to feel full. This happens more quickly if the baby is allowed to suck whenever he wants to from the time he is born. Once the baby starts sucking regularly, the breasts become soft again. This does not mean that the milk has diminished—if the baby continues to suck whenever he is hungry, the mother will have enough milk for him for at least four to six months.

The Sucking Reflexes

A healthy, full-term baby has three reflexes which help him to feed.

The Rooting Reflex

This reflex helps him to find the nipple. If something touches the side of his cheek and he is hungry, he opens his mouth and turns towards the touch.

The Sucking Reflex

When something goes into his mouth far enough, he sucks on it.

The Swallowing Reflex

When the baby's mouth is full of milk he swallows it.

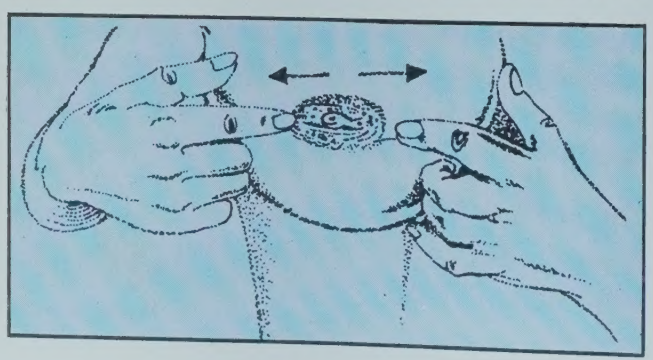
When a baby takes the nipple into his mouth he must also take in much of the areola so that he can press on the lactiferous sinuses. Both the baby and his mother have to learn how to do it.

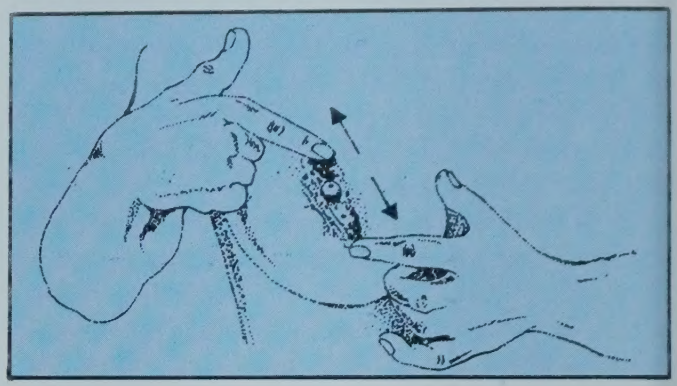
When a baby has had all the milk he wants from a breast, he usually stops sucking and releases the nipple by himself. He should then be put on to the other breast. If he does not release the breast on his own, the mother should put her finger gently into the baby's mouth to break the suction. However, the baby should not be pulled off the breast.

Preparation for Breastfeeding during Pregnancy

Every health worker who monitors a woman's progress during pregnancy should discuss breastfeeding with her, particularly if it is the first pregnancy, and prepare her for it. Each mother should be made to understand the advantages of breastfeeding. If she has experienced problems with breastfeeding in the past, such as engorgement or sore nipples, the health worker can explain to the mother how to prevent these problems.

Some women believe that their nipples are too short for breastfeeding. To assess this, press the areola on either side of the nipple. This makes most nipples stand out and look longer. Then, gently try and pull





the nipple and areola. If it can be pulled out, i.e., if it protracts well, there should be no problem. If it is not protractile, which is also referred to as retracted, these steps should be followed :

- Put a finger on each side of the nipple.
- Pull the fingers away from the nipple, stretching the areola skin and the tissues beneath.
- Repeat the movement several times. Repeat the exercise with the fingers above and below the nipple.

Experience among rural women has shown that most of them breastfeed their babies successfully and do not even consider an alternative. As a result, the problems discussed above are quite rare.

The health worker should also explain to the mother that it is equally important to keep her own body healthy and strong. She should be advised to eat an extra helping of the family food and some green vegetables as well. She should also try and take some rest, perhaps lie down for half to one hour in the afternoon, and whenever possible, switch to relatively lighter work, at least during the last two to three months of pregnancy.

Starting Breastfeeds

As soon after birth as possible the mother should put the baby to her breast. At first the breasts will produce only a little yellowish, thick colostrum, but it is enough for the baby. Colostrum is very rich in proteins, vitamin A and protective antibodies which protect the baby from neonatal infections. Many mothers, however, do not put the baby to the breast for one or two days or even longer in the mistaken belief that colostrum is bad for the baby. Instead, they feed the baby water sweetened with sugar, glucose or jaggery, a herbal mixture called *ghutti* or *janam ghutti*, or animal milk. This practice should be discouraged, firstly because the baby gets no nourishment during the first two days, and secondly, as a result of the baby not sucking the breast, the stimulus to milk production is delayed which interferes with milk production. This fluid may also cause infections if it is prepared in an unhygienic manner. To satisfy the cultural belief at the same time ensuring that the baby receives adequate nourishment, a drop or two of the fluid may be put into the baby's mouth carefully, making sure that it is clean and not likely to produce infections. Often the mother and her family can be persuaded to start breastfeeding after first squeezing out a few drops of what they perceive as the 'blocked up' milk. Health workers should emphasise to the mothers and their families the protective value of colostrum and encourage them to feed it to the baby.

Mature milk starts from the third or fourth day. The quantity also increases and the breasts tend to get engorged and tense. This, however, is relieved when the baby begins sucking vigorously.

As colostrum protects the baby from infections, breastfeeding should be started soon after birth.

How to put a Baby on to the Breast in the Correct Position

- Let the mother sit in a comfortable position.
- She should hold the baby in her arms, such that he faces the breast and his stomach is against hers. His whole body should face the breast.
- The mother should hold and offer the baby her whole breast, not just the nipple or areola.
- The mother should touch the baby's cheek or the side of his mouth with the nipple to stimulate the rooting reflex. An incorrect sucking position may lead to sore nipples, refusal on the part of the baby to feed, and the feeling that there is not enough milk. Many mothers prefer to breastfeed while lying down. As long as the baby has easy access to the breast and can be fed satisfactorily, there is nothing wrong with this position.
- Remind the mother to start the child on a different breast each time to help both breasts produce the maximum amount of milk.

It is important to put the baby to the breast in the correct position.

To begin with, the baby's feeding pattern is quite irregular. The mother should pick up the baby and feed him whenever he cries and when she feels a need to feed him. The baby wakes up several times at night as well, and should be fed whenever he appears to want it. This is how most rural women feed their babies, but the well-to-do urban women are anxious to set a time-table for the baby's feeds as soon as possible. They are afraid that if they allow the baby to get used to taking a feed at night he will always demand it, disturbing their sleep. They thus try and 'train' him not to demand a feed at night.

Babies may feed very irregularly at first—some feed more often than others and may want a feed every hour or so. Every baby is different, but most settle in to some kind of a rhythm after one to two months. Frequent sucking stimulates the production of prolactin which helps the milk to come in sooner, and prevents problems like engorgement.

Duration of Feeds

The duration depends on the baby, but usually five to ten minutes at each breast is sufficient. However, some babies are slow feeders and may take much longer. The baby should be allowed to finish at the first breast to make sure that he gets the fat-rich 'hindmilk', which comes towards the end of the feed. After that he can be shifted to the second breast.

Rooming-in

Soon after delivery, the mother should be allowed to keep the baby with her. She can feed him whenever he wants it, hold him, or clean him whenever necessary. Rooming-in is essential to encourage proper breastfeeding and it is quite safe for a baby to sleep in the same bed as his mother. This is what all our rural mothers do.

A baby should be fed whenever he seems hungry, both day and night.

Cleaning the Breasts

Frequent washing, especially with soap, is not necessary and it removes the natural oil from the nipples. The skin becomes dry and is more easily damaged and fissured. A daily bath is all that is needed to keep the breasts clean.

The less inhibitions a mother has about the place and environment of feeding, the more successful is breastfeeding. To a majority of women in towns and villages, breastfeeding is a natural phenomenon and they do not feel the need for privacy while feeding the baby. As a matter of fact, since the whole community looks upon it as a natural method of feeding, it does not attract any attention at all, and women can be seen feeding their babies in a variety of places—in the midst of crowds, at markets and fairs. Inhibitions accompany a higher social and economic level and the problems of breastfeeding also increase. Fortunately, however, an increasing number of educated women today breastfeed their babies and take pride in it.

Sucking for Comfort

Babies also suck for pleasure and comfort, not merely because they are hungry. They suck on anything that goes into their mouths—their fingers, a piece of cloth, a dummy, and of course a nipple or a teat. Many mothers think that a baby who wants to suck must be hungry and they give him a supplement which he does not need. Dummies should *not* be given as they often fall on the ground and become dirty. A little extra sucking at the breast is better than anything else.

Prelacteal Feeds

Many mothers give, often at the advise of the health workers, some cow's milk or powdered milk before the breastmilk 'comes in', in the fear that the baby might be hungry. It is a common practice in many hospitals. We know now that prelacteal feeds are not necessary and they can be harmful. The small amount of colostrum is all that a normal baby needs at this time. There is no need for prelacteal feeds after a caesarean section. Instead, the mother should be helped to breastfeed her baby. Babies who are given prelacteal feeds may not want to suck from the breast. The feed may be contaminated and the baby may get diarrhoea. He could also develop an allergy. The breastmilk is also delayed because the baby does not suck vigorously.

Exclusive breastfeeding should be promoted from birth to four to six months of age. No water, *ghutti*, fresh animal milk, infant formula or other liquids should be given before the age of four months.

A happy, satisfied baby who sleeps a good deal during the day, sleeps well at night, has normal stools and is growing well, is obviously getting enough food from the breast. However, there are some babies who, in spite of being well fed, wake up and cry at night. They want to be held, carried and comforted more than other babies. This leads to the mistaken belief that the baby is hungry and that the mother does not have enough milk to satisfy him. She thus gives the baby a supplement, but even that does not seem to satisfy him because he was not crying out of hunger. For any objective assessment one must be familiar with the growth pattern of infants and children. The simplest parameter is the weight and this can be recorded at home, at a clinic, or at a health centre. It should be remembered that one weight record is not enough for assessment. A series of readings over a period of time, and the upward trend of the weight curve are more important than just one weight recorded. A convenient method of recording the weight is on a mother-held growth card so that she herself understands how her child is growing. This will give her the confidence that her milk *is* sufficient for the baby.

A growing baby is getting enough breastmilk.

A breastfed baby swallows very little air while feeding and does not usually need to be burped. If, however, there is a tendency to vomit, burping should be advised. The baby should be held against the mother's shoulder till he brings up wind within a minute or so. He might even bring up a mouthful of milk but this is no cause for concern.

One never ceases to marvel at the qualities of breastmilk and how nature has made it the most suitable milk for the baby. Foremilk comes at the

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beginning of a feed. It looks blue and watery, but is rich in proteins, lactose, vitamins, minerals and water. Hindmilk comes at the end of a feed. It looks whiter as it contains more fat. A baby needs both the foremilk and the hindmilk for proper growth and development. Even malnourished mothers can and do produce good quality milk, even though they do it at the cost of their own health. It is important, therefore, to advise the mother to eat an extra helping of the family food to keep up her own strength and to be able to look after her baby better.

Advise the mother about her own diet as this is beneficial for both her and the baby.

Engorgement

When the milk first comes in, the breasts may feel full, heavy and rather hard. This fullness is due to the milk in the breast, and in order to remove the milk the mother should feed the baby. If feeding does not relieve the fullness she can express some milk, because if enough milk is not removed the breasts could become engorged which is often painful. The milk may then stop flowing as well.

Engorgement is uncommon among mothers who feed their babies frequently both day and night, and who feed exclusively from the breast soon after birth. Engorgement interferes with breastfeeding for the following reasons.

- The baby finds it difficult to suck properly.
- The mother feeds him less because his sucking hurts her.
- If the baby does not suck, the milk supply decreases.
- The breast may become infected, leading to mastitis or even breast abscess.

How to Treat Engorgement

- Let the baby continue to suck as far as possible.
- If the baby cannot suck well enough to remove enough milk, help the mother to express the milk. Hand expression is the best, but she can also use a pump, although the former method is preferable.
- Putting a warm compress on the breast or having a warm bath helps.
- After expressing some milk, the baby should be put to the breast.
- Expression of milk should continue as often as necessary to make the breasts comfortable.

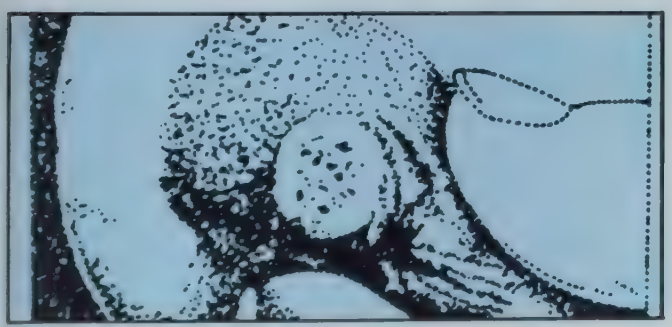
It is important to start management of engorgement as soon as it develops. This will prevent the mother from a great deal of pain and discomfort and help the baby to continue sucking.

How to Express Milk by Hand

Advise the mother to do the following:

- A cup or glass should be washed with soap and water and rinsed with boiling water or preferably boiled for two to three minutes to kill the germs. Drying the cup in strong sunlight also helps to destroy germs.
- Make sure the mother washes her hands thoroughly.
- She should lean forward and support the breast with her hand.
- Place her thumb on the areola above the nipple and her first finger on the areola below the nipple.
- She should press the thumb and finger.

- Help her to press the areola behind the nipple between the finger and thumb.
- Continue pressing and releasing.
- Milk begins to drip and then flows in a stream.
- The mother should then press the areola in the same manner from the sides to ensure that milk is expressed from all segments of the breast.
- The nipple itself must not be squeezed, but the areola pressed.



Engorgement is uncommon among mothers who feed exclusively from the breast and who feed frequently, both day and night.

Blocked Duct

The gland tissue in the breast is arranged in segments like those in an orange, and a duct leads from each segment. A duct may become blocked, causing a painful lump to form.

Treatment of a Blocked Duct

The baby should be allowed to continue to feed very frequently from the breast. Infection is secondary to congestion and stagnation in the breast and therefore the milk must be removed. If the baby's sucking is insufficient to express the milk, the lump should be gently massaged towards the nipple to try and unblock the duct.

Mastitis and Breast Abscess

If a blocked duct is not cleared the breast tissue may become infected. The breast becomes tender and swollen, and if untreated, an abscess develops. The mother experiences pain and a hot swelling which fluctuates.

Treatment of Mastitis or Breast Abscess

Encourage the mother to continue to breastfeed the baby. If sucking becomes painful or the mother has reservations about it, she must express her milk several times in a day. If the milk stays in the breast the infection could spread.

- She should continue to feed the baby from her breast.
- Warm fomentation also helps to relieve the pain.
- She should consult a doctor regarding a course of antibiotics or draining the abscess.
- Help her to start breastfeeding again from the infected breast as soon as possible.

Prevent the formation of breast abscess by timely action against engorgement and mastitis.

Sore Nipples

The most common cause of sore nipples is the baby sucking from a wrong position. If he does not have enough of the areola in his mouth he sucks only the tip of the nipple. Frequent washing with soap also contributes to the problem.

If the nipples become painful, the mother feeds the baby less often and for a shorter time, thus decreasing the milk supply.

To Prevent Sore Nipples

- Advise mothers not to wash their nipples with soap. They should wash them only while having a bath, i.e., once or twice a day.
- Help the baby to fix on to the nipple in the correct way.
- To take the baby off the breast at the end of a feed, advise the mother to wait until the baby himself releases the nipple. If he does not, the mother should put her finger *gently* into the baby's mouth to break the suction.
- If the pain continues, the milk should be removed by hand expression or with a pump and fed to the baby from a cup or with a spoon. Experience has shown that babies can learn to drink from a cup fairly easily.

Cracked Nipples

If the baby continues to suck from an incorrect position, it may damage the nipple skin causing a fissure or crack.

- The nipple should be exposed to the sun and air as much as possible.
- A drop of hindmilk should be left on the nipple after feeding as it helps the skin to heal. Cream from the top of milk (*malai*) can also be applied.
- If necessary, lanolin can be applied.
- If the pain persists the milk must be expressed and the expressed breastmilk (EBM) fed to the baby. There is no reason to stop breastfeeding altogether.

Put the baby to the breast in the correct position to prevent sore and cracked nipples. Washing the nipples with soap should be avoided.

Because breastfeeding is the most natural method of feeding for the vast majority of rural women who are absolutely relaxed about it, such problems as sore or cracked nipples and engorgement are quite uncommon among them.

'I Do Not Have Enough Milk'

This is one of the most common reasons cited by mothers for wanting to give their babies fresh animal milk or powdered milk. However, often the mother does have enough milk and all she needs is reassurance. The reasons why she thinks that her milk is not enough are that her breasts feel empty, the baby is crying, or the baby wants to suck a lot. The health worker has to decide whether or not the mother's apprehensions are correct.

The baby's weight gain is the best method to check whether or not he is getting enough milk. A healthy baby should gain about 1 kilogram (kg) per month for the first three months and about 600 to 700 grams (g) per month between four to six months of age. If the weight gain is normal the health worker should reassure the mother that she has enough milk and advise her not to begin a milk supplement. A baby who plays happily, sleeps well, passes normal stools, and passes urine several times a day is obviously getting enough breastmilk.

The Disadvantages of Artificial Feeding

- Contamination: artificial feeds are often contaminated with bacteria, especially if the mother uses a feeding bottle which she does not clean and boil properly.
- Animal milk does not contain living white cells and antibodies to protect the baby against infections. Artificially-fed babies fall ill more often with diarrhoea and respiratory infections.
- Animal milk may not contain enough vitamins for a baby.
- The iron from animal milk is not absorbed as completely as the iron from human milk. An artificially-fed baby may develop anaemia.
- Animal milk contains too much salt which may result in fits. Animal milk also contains excessive calcium and phosphates which may cause tetany, i.e., twitching.
- Animal milk contains more saturated fatty acids and does not contain enough of the essential fatty acids which are vital for proper growth and development.
- Animal milk contains too much casein, which is difficult for a baby's immature kidneys to excrete.
- Animal milk is more difficult to digest as it does not contain the enzyme lipase which helps digest the fat.
- Babies fed on animal milk may develop allergies.
- Animal milk is expensive and the family might not be able to afford it.

Any supplement started before the baby is four months of age increases the risk of infection and even death.

What to do to Ensure Adequate Breastmilk

- Reassure the mother that she has plenty of milk.
- Try to find out if she is particularly worried about anything.
- Let her sit or lie down in a relaxed position when she feeds the baby. Sometimes a warm drink also helps.
- Make sure that breastfeeding is not painful.
- The baby should be put to the breast in the correct position.

How to Increase a Woman's Milk Supply

- Give her confidence.
- Encourage her to rest more.
- She should eat well and drink plenty of fluids.
- Explain to her that it is better and cheaper for both her and her baby if she eats extra food rather than spends money on expensive milk for the baby.
- Make sure that the baby fixes on to the breast in a proper position.
- Encourage the mother to feed the baby more often during the day as well as at night.
- Make sure she feeds him longer than before at each breast.

Breastfeeding in Special Situations

Caesarean Section

Even though a mother experiences pain and discomfort after a caesarean section, breastfeeding should be started as soon as possible. The mother will need help to put the baby to the breast for the first day or

two. She can lie on her side and feed the baby if she finds this more comfortable.

Twins

Most mothers have enough milk to feed twins. However, they will need a lot of support and encouragement. Some mothers feed one twin first and then the other, while others prefer to feed them at the same time. The health worker should reassure the mother that she *does* have enough milk for two babies: recall that more sucking makes more milk.

Low Birth Weight Babies

- If the baby is very small and cannot suck, the mother should express her milk several times a day (six to eight times) and feed the EBM from a cup or with a spoon. While this might sound unrealistic, experience has shown that babies can quite easily drink out of a cup.
- The baby should be allowed to suck as soon as he is able to.
- Help him to fix on to the nipple properly.
- After the baby has sucked as much as he can, the mother should express her milk and feed him the EBM from a small cup or spoon. Bottles and teats are not necessary.
- The baby should be kept warm. The best way is to let the baby sleep with the mother, wrapped in the same blanket.
- Weigh the baby regularly to make sure that he is gaining weight.

Mother's milk is the best food for low birth weight babies.

Cleft Lip or Palate

A mother whose baby has a cleft lip or palate needs extra encouragement and support. With a cleft of the lips and gums there is usually no problem. If the cleft involves the palate, sucking is more difficult. The baby may seem to choke sometimes and the milk might come out through the nose. If the mother holds the baby in a more upright position this could be avoided. Some babies need to be fed EBM with a tube or a cup until they are able to suck well enough at the breast. Some others need to be fed through a special long teat.

Feeding an ill Child

Breastmilk is the most easily digested food for an ill baby. Therefore, breastfeeding should be continued when the child is ill. He may suck less strongly or for a shorter time, so more frequent feeds should be given.

Working Mothers

A common reason why mothers do not breastfeed is that they have to go back to work. If possible, the mother should take her baby with her to work, or ask someone to bring the baby to the work place. Mothers should be encouraged to breastfeed completely for as long as possible, at night, in the morning, and at any other time that she is at home.

The mother should breastfeed the baby as soon as

she wakes up. Before leaving for work, she should express as much milk as possible into a clean cup and leave it for the caretaker to feed to the baby from a cup or with a spoon. A feeding bottle should not be used.

Many mothers are able to express 400 to 500 ml even after the baby has been fed. The cup of EBM must be covered and left in the coolest place possible. Expressed breastmilk keeps well for twelve hours without refrigeration. It is not necessary to reheat the milk for the baby to drink.

Bowel Pattern in Breastmilk-fed Babies

A baby on breastmilk passes yellowish, sticky, semi-solid stools which might be slightly curdy or greenish at times. The number of stools varies a great deal but most babies pass six to seven stools a day, usually after feeds. They may pass a little bit of stool each time they pass some wind. This is often mistaken for diarrhoea and all manner of drugs are immediately administered, but it is a perfectly normal pattern and needs no treatment. On the other hand, some babies may be considered to have constipation because they pass a stool every second day, even though it is perfectly normal in consistency. This too needs no treatment.

Breastfeeding and Child Spacing

With frequent breastfeeding, both during the day and night, most women do not menstruate for a few months. Thus, breastfeeding contributes to child spacing. However, after three to four months, breastfeeding alone is not a reliable method of preventing the next pregnancy even if menstruation does not return. At this time a contraceptive should be advised.

- An intra-uterine device (IUD) is a very suitable contraceptive and can be inserted six weeks after delivery.
- A condom for men is also suitable for contraception.
- A doctor's advice should be taken regarding oral contraceptive pills as some of them can reduce the amount of breastmilk.

Breastfeeding and Another Pregnancy

Some mothers believe that if they become pregnant they should stop breastfeeding the first baby. They often do it suddenly, with the result that the breasts get engorged. The baby is put on to artificial feeds suddenly, which he may not like and hence refuse to feed. Besides, there is a risk of infection. The health worker should assure the mother that there is no harm in breastfeeding her baby and that there is nothing wrong with her breastmilk during another pregnancy. However, if she insists on discontinuing breastfeeding, it should be done gradually, spread over a couple of weeks.

Breastfeeding when the Mother is ill

A common reason for a mother to stop breastfeeding is because she herself might be ill. However, unless the illness is very severe, breastfeeding should be continued as it is much more dangerous to start a baby on artificial feeds than it is to let him feed from his ill mother. She should be assured that her milk is safe for the baby. However, if she is still unwilling to breastfeed she should express her milk or someone can help her do that. In this way her breasts will continue to produce milk and she can continue breastfeeding when she is well again.

If the mother is admitted to hospital, every effort should be made to admit the baby with her too, so that she can continue breastfeeding.

If the Mother has Tuberculosis

There is a common belief that because tuberculosis is infectious, the baby should not be breastfed. The

danger of the baby contracting the disease is not from breastfeeding but from close contact with the mother. Tubercle bacilli are not excreted in breastmilk. The baby should be protected with BCG vaccine (if he has not already had it as a part of immunisation), and the mother should receive regular treatment. If the baby is taken off breastmilk, he is likely to develop infections. Therefore, it is important to continue breastfeeding.

Leprosy

If the mother has leprosy, breastfeeding should be continued as the disease has very little infectivity. The mother should receive appropriate treatment so that the disease becomes non-infectious and she is completely cured.

Most medicines are excreted in breastmilk, but the quantities are so small that these do not adversely affect the baby. However, whenever in doubt, seek the doctor's advice.

Feeding in Special Cases

There is increasing evidence confirming that breastmilk is the best food for the baby. Any milk other than breastmilk has no anti-infective properties to protect the infant during the early months of his life. Besides, it is almost impossible to prepare a hygienic bottle feed in a poor environment with shortage of fuel, clean water and clean utensils. The mother's lack of knowledge of how to prepare the feed and in what proportion milk powder and water should be added is another problem. Because milk is expensive, she tends to add more water to it to make the tin of milk last longer, thus resulting in the child being underfed. The same is true when fresh milk is used.

In affluent homes where much better facilities are available and expense is not a problem, infections can be minimised, but the high protein and mineral content of animal milk poses a serious problem, even though some of the powdered brands are modified to a certain extent. Therefore, breastmilk is the best food for the baby and an increasing number of educated women all over the world are breastfeeding their babies.

Nevertheless, it will always be true that for one reason or another a small minority of mothers will not be able to adequately breastfeed their babies. It is for them that this section is written. But it remains true, and must be emphasised, that most of those mothers who believe they cannot breastfeed their child could do so if they were more motivated and were helped to overcome any problem by a family member, a friend, or a health worker.

If the mother's milk diminishes considerably, then by the age of four to six months, or earlier if necessary, one or two feeds of animal milk (150 to 200 ml) can be given with advantage. Milk should be fed to the child from a cup or a glass and not from a bottle. If, however, the family cannot afford milk they can

manage with breastmilk accompanied by semi-solids and solids to cover the entire requirements. A child of one year needs no more than 500 to 600 ml of milk. Milk is a prestige food and most mothers who can afford it tend to feed the child too much of it. Some mothers who give their babies more than a litre of milk a day have been known to complain that the baby does not eat anything else. On the other hand, the poorer mothers do not like to admit that they cannot afford to give their child milk. When asked they usually give wrong information and feel guilty because they cannot afford more of it for their child. If the economic status of the family allows it, some animal milk should be given along with semi-solids and solids. The milk should not be diluted. The protein in milk is superior to vegetable proteins, and milk is a rich source of calcium, phosphorus, riboflavin, and a reasonable source of vitamin A. Some babies do not like milk. However, they should not be forced to drink it as milk can be given in several other forms—curd, porridge, *khir* and cottage cheese (*panir*).

Bottle or Cup

Bottle feeding should be avoided at all cost because most mothers do not realise the importance of a clean sterile bottle. Nor do they have adequate resources to clean and boil the bottle. With a little patience, the baby can be taught to take the milk with a spoon, particularly the long-spouted spoon which is called *paladha* in south India, *jhinook* in Bengal or *bondla* or *gokhari* in Maharashtra. They are convenient to hold and easy to clean. The baby can also learn to drink from a cup. Even low birth weight babies are able to drink from a cup. A review of a number of studies carried out in the developing world found that bottle-fed babies were twenty-five times more likely to die in the first six months of life than those who were exclusively breastfed. Therefore, exclusive breastfeeding should be encouraged for the first four to six months.

A bottle is very difficult to clean and is a source of infection. Do not use a bottle; use a cup or a spoon instead.

Type of Milk, and How Much to Give

The common sources of animal milk in India are goat, cow and buffalo. In several urban areas there are milk schemes in which milk with a certain content of fat and solid is sold. The differences between the varieties of animal milk and human milk are shown in Table 1.

Table 1 : Composition of Milk (per 100 ml)

	Carbohydrates (g)	Protein (g)	Fat (g)	Energy (g)
Human	6.8	1.5	4.0	68
Cow	5.0	3.5	3.5	66
Buffalo	4.5	4.3	7.5	103
Goat	4.5	3.7	4.8	76

The table reveals that the composition of human milk is unique for it is made to suit the growth pattern of the child which is very different from that of cows, buffaloes and goats. The energy content of buffalo's milk is higher than others because of its high fat content, which also makes the milk difficult to digest. This can be remedied by boiling the milk and allowing it to stand for a while. The thick cream on top can then be removed and will reduce the fat as well as some casein in the rest of the milk. This cream can be eaten with fruit or *roti*, or used in cooking. Because of the low carbohydrate content, and also because children like sweet milk, one level teaspoon of sugar can be added to 75 to 100 ml (half a cup) of milk. This also

increases the energy content. One level teaspoon of sugar supplies about 15 calories.

There is a widespread custom prevalent throughout India of diluting the milk for the baby. Sometimes the amount of water added is more than the milk, and is often contaminated as well. Obviously this manner of feeding milk will lead to gross underfeeding; the child will remain hungry and will not gain weight. Some mothers dilute it due to ignorance, others because milk is expensive. Milk from a reliable source may be diluted with boiled water in a ratio of 3:1 (three parts of milk and one part of water) for the first two months only. Sugar should be added as already advised. If the quality of milk is unreliable, as is often the case, it *should not* be diluted. The quantity of feed will vary to a certain extent with each baby, but Table 2 is an approximate guide.

Powdered milk has invaded the rural market as well and is considered prestigious. However, its use should be discouraged as it is often associated with bottle feeding which, as already mentioned, should be avoided at all cost. Besides, there are the problems of boiling water, knowledge regarding the correct amount of milk powder to use, etc. It is far simpler to use fresh animal milk.

Table 2 : Quantity of Feed

Age of Infant	Approximate Amount of Feed
Birth to 1 month	50-75 ml (2-3 oz) 6-7 times a day
1 to 2 months	75-100 ml (3-4 oz) 6-7 times a day
2 to 4 months	100-125 ml (4-5 oz) 5-6 times a day
4 to 6 months	150-175 ml (6-7 oz) 4-5 times a day
Beyond 6 months	175-200 ml (7-8 oz) 4-5 times a day

The preceding description shows the many advantages of breastfeeding and the many problems associated with artificial feeding. Breastfeeding is simple, the milk is readily available and clean, and best suited to the baby. The mother does not need to know the quantity of milk the baby requires. All that she needs to be concerned about is a happy, contented baby who is growing well. In the case of artificial feeds, keeping the cups and spoons clean, buying milk, worrying about it going bad in hot weather, and often lacking knowledge of how much to give and how to give it to the baby are serious problems.

In a community that is socio-economically poor and illiterate, with poor water and sanitation facilities, breastfeeding can make the difference between life and death. The infection rate among artificially-fed babies is very high. Of all the babies that are brought to a hospital or clinic with diarrhoea, hardly one of them is entirely breastfed. Diarrhoea leads to malnutrition, and further dilution or reduction in the amount of milk by the mother enhances malnutrition, and so the vicious cycle continues. The unique advantages of breastfeeding are so obvious that it is surprising how little health workers are committed to it. Gradually, the situation *is* changing, but the advantages of breastfeeding need to be repeatedly emphasised both to mothers and to health workers.

Artificially-fed babies have a very high risk of infection, which in turn leads to malnutrition and even death. Exclusive breastfeeding should be encouraged for the first four to six months. Any addition to breastmilk (even water) greatly increases the risk of infection and increases the likelihood of the mother failing to produce enough milk.

ADDITION OF SEMI-SOLID AND SOLID FOODS

Breastfeeding should be continued for as long as possible, preferably until the child is one and a half to two years. However, after about four to six months many mothers do not have enough milk for this to be the sole source of food for the baby, and this is the time when some other food will have to be started in addition to breastmilk. Unless this is done the baby will not gain weight—in other words, growth will falter. It is important to remember, however, that the introduction of additional foods *before* four months can adversely affect the amount of breastmilk—because the baby will be less hungry he will suck the breast less vigorously and less often, which will reduce the amount of milk secreted. Besides, there is the danger of introducing infections.

The most common cause for a baby not gaining weight on breastfeeds is inadequate quantity of breastmilk. He will cry and suck his fingers. The problem can be solved by letting the baby feed more often. However, if there is no improvement despite looking into every possible reason for inadequate breastmilk and encouraging the mother, the baby will have to be given some semi-solid foods in addition. Some amount of animal milk too can be given.

There are several cultural beliefs in different parts of India with regard to the suitable time to start semi-solid foods. Some communities have a religious ceremony called *annaprashan* which is observed when the child is between six and nine months of age. During this time certain foods are not given to the child. However, as this practice usually applies to cereals alone, the mother can be persuaded to feed the child other foods—fruits, vegetables, *dal*, etc.—until the ceremony is over.

Because of poor knowledge on the part of the mother regarding the nutritional requirements of her baby, many babies do not get adequate food between the age of six months and two years when the baby is totally dependent on the mother or a mother-substitute for feeding. Many mothers are busy, and might be away from home for long periods during which feeding is left to an older sibling, who is herself a child and who might not want to spend enough time in feeding the baby. By this time the breastmilk is substantially reduced and the mother does not know what, how much, and when other foods should be given. She often feeds the child the top water of *dal*, vegetables,

etc., which has no calories or semi-solids in meagre quantity and it does not add appreciably to the total energy intake. If solid foods are not introduced at the right time and in sufficient quantity the child may become undernourished, after which it is often difficult to get him to accept these foods. Instead, he clings on to the breast. However, the breast should never be allowed to become a mere pacifier. Too often does one see a marasmic baby clinging on to the empty breast, yet appearing to be content. Not being used to any other type of food, he rejects all efforts to feed him.

Knowledge of Weaning Foods and Practices

While low income plays a vital role in undernutrition, ignorance about nutrition is equally, if not more, important. Studies in several countries including India have shown that almost half of all cases of malnutrition are to be found in households where there is no *absolute* shortage of food. The reason why available food is not given to the child is that the mother does not know how much the child needs or does not recognise that her child is not growing and is becoming malnourished. In many cases it is difficult to feed the child because of depressed appetite due to some infection or the erroneous belief that food should be withheld during an illness. Most mothers do not understand the importance of weaning foods. From a diet consisting purely of milk, the infant is expected to go on to thick *roti* and other such household foods. The baby nibbles at it, and spits it out. Three things are important here: first, what foods to be given at what age; second, the quantity to be given; and third, how often to feed. While advising the mother about a baby's diet it is important to keep the economic state of the family and the availability of different foods in mind. If the health worker advises foods that the mother cannot afford, she will lose all confidence in her. As far as possible, the family food should be given to the child, but after it has been softened and mashed. There is no need to cook special food for the baby, except for a short time initially. The food should be soft but not watery, and the child's portion can be taken out before adding spices. Certain fears and prejudices on the part of the mother (or grandmother) should be allayed. For instance, the mother often wonders how her child will eat when he has no teeth. Instead of brushing the query away she should be told that if the food is soft and mashed, the baby does not need teeth to eat it.

The cultural beliefs in 'cold' and 'hot' foods should not be condemned outright. There are innumerable alternatives that can be fed to the infant which are equally nutritious. The erroneous belief that cereals are bad for the liver can also be overcome with tact and patience. Banana is believed to produce cough and phlegm, while orange is believed to be bad when the baby has a cold. Mango is considered 'hot' but becomes 'cool' when soaked in water for some time. All these beliefs can be overcome with patience and alternatives may be suggested.

No one food is a 'must' for a child (except breastmilk).

A convenient mixture can be made up from the variety of foods available. Food cooked in oil is very good for the baby as it increases energy or calorie intake. A shortage of energy is the primary problem faced by Indian babies. Most Indian food is bulky and the child's stomach is small, with the result that only a small amount can be fed at a time. This too has to be explained to the mother. Many mothers do not freely talk about these problems, yet they might not feed a particular food to the baby because they believe it is unsuitable. The most important quality of

a health worker is to establish such a relationship with the community that the mothers feel free to discuss their problems with him or her. The health workers themselves might have to open their eyes to problems and issues they may not have recognised.

Most parts of India have a warm climate for the better part of the year and food does not keep for long. Hence, all foods should be as fresh as possible and should be cooked or reheated hygienically. All the utensils should be clean, and hands should be thoroughly washed with soap before cooking and feeding. It is customary to clean the utensils with mud or ash. Mud can cause infection but ash, if taken from the oven and kept in a clean place, is a good cleansing agent. Food should be kept covered and protected from dust and flies.

In India, fortunately, most diet patterns consist of a mixture of cereals and pulses: *idli* and *dosa* in the south, *khichri* and *missi roti* (a mixture of wheat and gram flour) in the north. As a matter of fact, the words *dal-chawal* and *dal-roti* are used as one word, indicating that they are meant to be eaten together. This enhances their food value.

Food should be served to the child in a separate plate or bowl rather than out of someone else's plate, so that the mother has a fairly good idea of the quantity the child has eaten. It also encourages the child to learn to feed himself.

One or two teaspoons should be fed initially and without haste so that the child gets accustomed to a different taste and consistency. Initially, a baby might spit out the food. This does not mean that he does not like it. Learning to swallow semi-solid foods is difficult for a baby who has only known how to suck at the breast. Husk, bean skin and vegetable fibres may cause indigestion, as a result of which all foods must be thoroughly mashed to start with. The child should never be forced to eat—feeding should be a pleasant experience, one that both the mother (or mother-substitute) and the baby should enjoy.

The food should not have chillies or spices and should be comfortably warm or cool—neither too hot nor too cold. The child should set the pace and not the mother. If the child refuses to eat a particular food it should not be tried out again for a few days, but should be substituted by some other food. Remember that there are many foods to choose from and just as adults have their preferences a baby is also entitled to his. Some babies prefer sweet things while others like salty foods. The greater the variety of foods a baby is offered the better the chances of his nutritional needs being met.

Fruits such as *mosumbi*, apple, grape and seedless pomegranate (*bedana anar*) are traditionally considered to be good for the health and mothers spend a great deal of money to buy these rather than banana, mango, guava, *chikoo* or other energy-giving foods. The mother should be dissuaded from wasting money on them when other nutritious and cheaper foods are available.

Should semi-solids be given before or after breastfeeds? While it is true that a hungry baby will suck the breast vigorously, thus stimulating the prolactin and the let down reflex, and in turn help milk production, it is also true that some babies do not accept semi-solids once their hunger is partly satisfied. Each baby is different and if the baby eats the semi-solid food happily and readily after the breastfeed, this method is undoubtedly preferable.

Some mothers do of course produce an adequate quantity of breastmilk for a longer period. It the baby is continuing to grow normally on breastmilk alone, the introduction of semi-solids can be deferred till a later age, but in no case later than six to seven months.

Semi-solids should be introduced when the baby is four to six months old. Continue to give him breastmilk as well.

What Foods to Give?

Four to Six Months

Start with mashed fruit like banana, or a cereal like *suji*. If *suji* is not available, a porridge can be made with *atta*, ground rice, *ragi* or millet, mixed with water or milk and a small quantity of oil or *ghee*. This is very important as oil is a very rich source of calories. Give one to two teaspoons to begin with and gradually increase the quantity over the next three to four weeks so that by that time the baby is eating 50 to 60 g of porridge (half a cup) or one whole banana. Other fruits in season like papaya, *chikoo* and mango can be fed in a similar way. In the hills, apple, apricot or pear can be given after cooking them for a few minutes. Sago is pure starch and hence is not very suitable. Several pre-cooked baby foods are sold in the market but are expensive. As they provide the same nourishment to the baby as any other food prepared by the mother at home, fresh foods prepared at home are always preferable.

Six to Nine Months

As mentioned earlier, most mothers are busy with household work and other activities such as fuel gathering, fetching water, and activities related to agriculture or income generation. Besides, there is shortage of fuel for additional cooking. Therefore, the aim should be to encourage the baby to eat the family food as soon as possible. Mashed rice with *dal*, *khichri*, mashed vegetables, or *roti* softened in *dal* or milk can be fed to the baby from the family food. A little oil should be added for extra calories. Spices can be added once the baby's portion has been taken out. The diet should contain some green leafy vegetables which are rich in vitamin A, iron and calcium. They also contain vitamins B and C. The green vegetables can be given separately or added to *dal*, *khichri* or stuffed in *roti* or *paratha*. Semi-solid foods can be fed three to four times a day in addition to breastfeeds.

Nine to Twelve Months

A variety of household foods can be given five or six times a day, such as rice, *dal*, *roti* or *khichri* and vegetables, and the quantity can be gradually increased. *Idli*, *uppma* or a mixture of curd and rice are popular in the south. The foods fed at this stage do not need to be mashed. Further, a variety of vegetables and seasonal fruits can also be given. Foods like curd, egg, *khir*, *dalia* and bread can be fed to the child. Egg can be given in boiled or scrambled form. The popular belief that raw egg and milk (egg flip) is more nourishing than cooked egg and milk separately is not correct. As a matter of fact, raw or inadequately cooked egg can lead to Salmonella infection. A soft-boiled egg is not more digestible than a hard-boiled or scrambled egg. Some fish or minced meat can be introduced in non-vegetarian families. The baby should now be eating almost everything that is cooked in the house.

Small babies need to be fed five to six times a day. Add one to two teaspoons of oil to the food to increase the energy density.

A child needs food that is:

1. Concentrated in energy.
2. Nutritious.
3. Soft and easy to chew and swallow.

One to One and a Half Years

By this age the child should be eating *all* the household food, although it might still have to be softened and given without spices. At this stage the mother probably has only 200 to 300 ml of breastmilk, with the result that the bulk of the energy (1,000 calories) has to be supplied by solid foods. The mistake that most mothers make is in giving a variety of foods, but in very small quantities, which does not contribute much to nutrition. *Dal*, *khichri*, etc., should not be made too thin and watery because the bulk of the feed in that case will only be water. A little oil or *ghee*, as mentioned, should be added to the food as they are very rich sources of energy.

Most Indian foods are bulky and the child will need to eat five to six times a day to satisfy his energy needs. A child of one to two years needs half the food that his mother eats.

Even though a variety of foods have been mentioned, it must be remembered that a child can be fed satisfactorily on simple household foods provided he is fed enough and at least four to five times a day.

A child of one to two years needs half the amount of food that his mother eats.

Points to Remember About Feeding

It should be remembered that there are no set rules about feeding. Rather, it is a matter of commonsense. Like adults, babies too like a particular food more than another, and are more hungry on some days than on others. Force-feeding should be avoided and meal times should be a pleasant experience rather than a torture. To get some accurate idea of the amount the baby has eaten, he should be fed in a separate bowl or plate, as mentioned earlier. As bowls come in different sizes, one should be familiar with the sizes before giving the mothers advice. Their shape should be such that they can be easily cleaned. The edges should be rounded so that the child is not in danger of being hurt. Any metal or plastic material can be used. While it is convenient and hygienic to feed with a spoon, hand feeding should not be looked down upon or discouraged. This is an accepted method of eating in most parts of India. What should be stressed, however, is that the hands should be thoroughly washed with soap and water and the nails cut short and scrubbed frequently.

Even if the mother understands the nutritional needs of her child and methods of feeding, she herself may not be available to feed the baby at all times because she may be away from home and working. The foster mother is usually the older sister, who may be only eight to ten years old herself, a mere child without the tact or the patience to feed the baby. The food requirements of the baby might not have been explained to her and she may feed the baby only when she herself is hungry. Besides, being very young herself she might be more interested in playing than in feeding the young infant. Furthermore, she may not realise the importance of following the advice regarding clean hands and protecting the food from flies and dust by covering the food and utensils. A working mother is an intrinsic part of our agricultural rural scene as well as the urban slum. This makes the problem of nutrition for the child even more complex.

Once babies begin to crawl and become more independent of their mothers, they come into greater contact with germs in the environment. When the baby is very small, he still has the protection (immunity) received from his mother during her pregnancy. But after four to five months this protection goes and babies start to develop their own immunity as they come into contact with germs in the environment. Because of this change, they are very likely to get infectious illnesses from the age of about four to five

months, especially if they are not breastfed. This is why any food prepared for babies should be stored and fed to them in a hygienic manner, or else it can act as a vehicle for infection as well.

Food can be infected with germs:

1. Before it is brought into the house.
2. During storage.
3. During preparation.
4. After it has been prepared but before it is fed to the baby.

To reiterate, India has a warm climate for most of the year and efforts have to be made to keep the food in as cool a place as possible and reheat it before feeding it to the child. However, this is often difficult in view of the constraints regarding fuel as well as lack of time.

Utensils should be scrubbed thoroughly and kept in the sun to kill the germs. The area where the food is cooked should be clean and free of insects and flies. Vegetables, as also meat, poultry and fish, should be bought fresh. Hands should be washed thoroughly before feeding the child.

Feeding During and After an Illness

Many mothers believe that the child's food should be reduced during an illness, and they tend to give him only small quantities of milk or thin porridge or *khichri*. This belief is certainly not correct. The child does lose his appetite during an illness, but the mother should coax him to eat as much as possible and give him small quantities of food frequently—every one to two hours. For a few days after the child recovers, he needs to eat more than what he was eating prior to his illness so that he can regain the weight lost during his illness. Often the cause of malnutrition is not so much the illness but the restriction of food.

MAIN CATEGORIES OF FOOD

Cereals

Different cereals are eaten in different parts of India. Rice is popular in the south and east. In other areas wheat, *jowar*, maize and millets are eaten. But rice is a prestige food in the south and many people spend much more money on it rather than buy any other, cheaper cereal. It is important to get the best value for money spent as well, and more of the coarse cereals can be bought for the same amount of money. This will contribute to better nutrition. Cereals contain 7 to 14 per cent protein, about 75 per cent carbohydrate, and a fair amount of fat. Rice contains 7 per cent protein, but it is of better quality. The protein in rice has little cellulose and is well-absorbed. Rice is eaten boiled, puffed or in flattened form. Because cereals are widely eaten, they are the most important source of iron, energy and protein, as well as of fat in the Indian diet.

The nutritional value of maize is similar to that of other cereals, but there are some differences. Although yellow maize contains carotene it is a poor source of vitamin A. The principal protein is zein which forms half the total protein. Zein is relatively deficient in the essential amino acids, lysine and tryptophan. Tryptophan is converted in the body into vitamin and nicotinic acid. Nicotinic acid is also present in cereals, but in maize most of it is in a bound form and is not available in the body. Pellagra is a deficiency disease caused by the lack of nicotinic acid in the body and is therefore often associated with eating maize.

Tubers and Starchy Roots

These are usually eaten in addition to cereals. The common tubers are potato, sweet potato and colocasia (*arwi*). In parts of Kerala, tapioca or cassava is eaten instead of rice because it is cheaper. This is mostly carbohydrate and, if eaten alone, can result in protein deficiency. Because it is bulky it is difficult for a child to derive enough energy from tapioca. Fortunately, in the areas where tapioca is eaten, dry fish, which is a rich source of protein, is also available. However, it is not always fed to young children for economic or other reasons, and protein

calorie malnutrition is not uncommon. Because of the prestige value of rice many families are switching from tapioca to rice, even though it is much more expensive.

Potato is a good source of vitamin C, although about two-thirds is destroyed while cooking. This is a very popular food with children and they can consume potato in large quantities. It is a very rich source of energy and can replace part of the cereal intake. Sweet potato, too, is rich in energy and can be eaten boiled or roasted.

Legumes

The Indian diet consists of several kinds of legumes such as lentils, Bengal gram, red gram, black gram, horse gram, *rajma* and *lobia*, to name a few. Red gram is mostly eaten in the south, west and the central parts of India. In the north, pulses with husk are preferred. Because they are expensive, their intake has recently become limited among the poor income groups. However, they are still a much cheaper source of protein than meat, fish or milk. Their protein content is 20 to 25 per cent. The immature legumes do not have much protein in contrast to the dry legumes which are rich in protein. They are useful sources of vitamins and minerals. Sprouted legumes are a rich source of vitamin C. Roasted gram is a very popular snack. It is also eaten as *chicki*, along with groundnut and jaggery.

Recently, soybean, which contains 40 per cent protein, has become quite popular in urban areas. It has a rather bitter taste and a brownish colour, but by newer methods of processing the taste can be masked. Soybean has a powerful trypsin inhibitor which is destroyed only on autoclaving.

Oil Seeds and Nuts

These are mainly used to extract oil. The remaining cake, which is very rich in protein, is unfortunately rarely used for consumption and is given to animals. Some amount is now being processed to feed to children. Roasted groundnut is consumed a great deal during the winter months. In Maharashtra and Gujarat, green, boiled groundnut is very popular. The cultivation of sunflower is also being promoted.

Vegetables

There are innumerable varieties of vegetables. They are low in calories and proteins and add bulk to the diet. They are, however, rich sources of vitamins A, B and C, and of iron. The dark green or yellow vegetables are especially good sources of β-carotene. Usually the darker they are the more vitamins and minerals they contain. By and large, children do not seem to relish vegetables, but they should be encouraged to eat them because of their vitamin and mineral content. A small quantity of dark green, leafy vegetables can be cooked, chopped finely and mixed with the baby's food to mask the taste.

Fruits

These are tastier than vegetables and are eaten raw, with the result that the vitamins are not destroyed. Different regions of India produce different fruits, but unfortunately most do not reach the rural areas except banana, guava, melon and mango. In the

hills, pear, apple, plum and peach, among other fruits, are available. Banana is rich in carbohydrates and contains 80 calories per 100 g. It is easily digestible and is a very good weaning food. Citrus fruits are rich in vitamin C. Guava, however, is a far richer source than orange. The amount depends on how fresh the fruit is. Mango and papaya are rich sources of vitamin A. Grape is a prestige fruit. It is expensive and provides only sugar, but is comparatively cheaper in areas where it is being cultivated. Lemon juice with sugar is a favourite summer drink and supplies both calories and vitamin C.

A lot of money is spent on such fruits as apple and *mosumbi*, once again because of the erroneous belief in their health-giving properties. They are not a good source of nutrients and the money spent on them can be better utilised on more nutritious foods such as banana, egg, milk, or *dal*.

Fats and Oils

These are used in cooking and supply calories to the diet. Solid fats like butter and *ghee* (clarified butter) and other animal and some vegetable fats contain largely saturated fatty acids. Liquid oils, on the other hand, are rich in unsaturated fatty acids which are considered better for the heart. Animal *ghee* is greatly valued for its flavour and food qualities and has high prestige value, but its use is negligible now because of its cost. Different oils are used for cooking in different parts of India: mustard oil in Bengal, Assam and Kashmir, and groundnut oil, sunflower oil, gingelly oil, and *til* (sesame) oil in other parts of India. In urban areas, a great deal of hydrogenated oil or vegetable *ghee* is used. This is fortified with vitamins A and D. Fats and oils are the richest sources of energy and contain two to three times as much energy as wheat or rice and their addition to the diet increases the calorie content. However, because they are expensive their use is restricted, but efforts should be made to include some in the diet of children.

Sugar and Jaggery

In rural areas, jaggery (*gur*) is the most common sweetening agent, but refined sugar is increasingly replacing it because of its prestige value. Jaggery is cheaper and contains 11.4 mg iron, 168 mg carotene and 80 mg calcium per 100 g. It has small quantities of vitamin B, riboflavin and niacin. Sugar, on the other hand, is devoid of all these minerals and vitamins. The energy content of both is about 390 calories per 100 g.

Fresh Condiments and Herbs

The main items in this category are ginger, mint, coriander, curry *patta* (leaves) and green chillies. These, together with onion (green or dried), are used in cooking and are eaten as *chutney*, either to enhance the flavour of food, or to replace vegetables or *dal* in poor homes. They supply some vitamins to the diet. It is amazing how much chilli and spices even young children can eat.

Dried spices are mainly used as flavouring and do not themselves contribute any nutritional value to the food.

Foods of Animal Origin

These contain high quality protein, but their use is limited because they are very expensive. They are easily digested and are a source of vitamin B_{12} in the diet. They also help the absorption of iron from the diet.

Meats

Meats are a good source of protein, vitamin B and iron. Their protein content is about 18 per cent. The amount of fat varies. Liver is a good source of iron, vitamins A and B, and also contains some vitamin D.

Indians are conservative about the meats they eat. Mutton and chicken are most common, although pork and beef are also eaten by some. Undercooked meat may be a source of tapeworm infection.

Fish

Fish is mostly eaten in the coastal regions. In Bengal, river fish is preferred. Some types of fish, like sardine and *hilsa*, are rich in oil. Fish is a rich source of protein and vitamins A and D. Dried fish is very rich in protein. Fish bones are rich in calcium and can be eaten along with the flesh in the case of small fish.

Egg

Egg is rich in essential nutrients. An average hen's egg contains 6 g of protein and 6 g of fat and provides about 80 Kcal. Egg yolk is a rich source of vitamins A and B.

Milk

While milk is an excellent food for children, it has already been established that children can grow satisfactorily on a diet composed *entirely* of cereals and vegetables. Thus, the inability of many families to provide milk for their older children should not depress them as long as appropriate alternatives are given. *But during the first year of a child's life, milk, especially human milk, is extremely important.*

Human Milk

Colostrum

This is a yellowish secretion produced during the first three or four days of lactation. It contains more protein but less sugar and fat than mature milk. The globulin content is high and it is rich in protective antibodies, particularly the polio antibody. Because it looks thick and yellow and not at all like milk, many mothers regard it as unsuitable for their child and discard it. This is very wrong. Colostrum is very valuable as it protects the newborn baby from infections, and initiating breastfeeding from the time of delivery helps in successful lactation.

Mature Milk

This is low in protein as compared to cow's or buffalo's milk. The human baby grows much more slowly than a calf, and his need for protein is also less. The casein content in human milk is one-sixth that of cow's milk. The amino acid content is similar.

Lactose is the principal carbohydrate in milk. Its presence in the intestine stimulates the growth of

micro-organisms and helps in the synthesis of vitamin B. Human milk contains one and a half times as much lactose as cow's milk.

Milk has a low content of iron and copper which are required for blood formation, but it is rich in potassium, calcium, phosphorus, chlorine and sodium. Vitamin A is also present in adequate amounts. The quantity of vitamins B and C depends on the mother's diet

Animal Milk

The milk of several animal species is used in India as food for humans. The goat is the poor man's cow. It feeds on other people's hedges and bushes and does not cost the owner anything to feed. The amount of milk the goat gives is enough for the baby, provided other foods are also given. Cow's milk is preferable to buffalo's milk because of its lower fat content, but it is not as readily available partly because of the low milk yield of indigenous cows. In the hill areas, cow's milk is more popular, but in the rest of the country buffalo's milk is more commonly used. In many urban areas there are milk schemes which supply milk with a fat content of 3 g per cent.

All types of animal milk provide high quality protein, mostly in the form of casein, in contrast to the protein in human milk which is mainly lactalbumin. Human milk has a higher sugar (lactose) content than cow's or buffalo's milk. The fat content of buffalo's milk is almost double that of human or cow's milk. Milk is a rich source of riboflavin and calcium, and contains some amount of vitamins A and C. However, it is a poor source of iron, and babies who are fed exclusively on milk tend to develop anaemia. Goat's milk does not contain any vitamin B_{12}. *For babies, animal milk is inferior in every way as compared to human milk.*

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Milk Products

Curd, Cottage Cheese (*panir*), *khoya* and Butter

Curd is a popular food in most parts of India, particularly in summer. A small quantity of curd is used to set the milk which is kept for a few hours, depending on the weather, after which firm curd is set. Curd has the same food value as milk and is an excellent food for children during and after an episode of diarrhoea. In north India, curd is churned, the fat separated as butter, and the remaining *lassi* is a popular drink. *Lassi* is rich in lactose and protein and is a cooling drink in summer. It is also an excellent drink for children to prevent *and* treat deydration during an episode of diarrhoea.

Panir is made by adding some lemon juice or curd to boiling milk. The curdled portion is tied in a cloth and hung for a few hours until most of the water drains out. The solid portion that remains, or *panir*, can be cooked in several ways and eaten as a savoury or as a sweet. Sweets such as *rasgoola* are made with *panir*. The whey which is drained out contains lactose, thiamine, riboflavin and some lactalbumin; it contains no casein or fat. Cheese is rich in both protein and fat.

Khoya is made by cooking the milk on a slow fire till it is dry. It is used for making sweets, and is rich in protein and fat.

Butter is made by churning the curd and removing the top fat. Its only constituent is fat, and therefore contains some vitamin A. The fat in cow's and buffalo's milk contains about the same amount of vitamin A, although in the latter carotene is not naturally present.

PROCESSING OF FOOD

Cooking

Most foods, except fruits and a few vegetables, are cooked before they are eaten. This improves the taste, flavour and digestibility. It also reduces the bulk and water content and destroys disease-causing bacteria. The starch and other nutrients within the foodgrain become more easily accessible to the digestive enzymes. Cooking makes meat softer and capable of being chewed. Pulses and legumes become more digestible. The biological value of protein in some foods also improves on cooking.

Cooking involves many processes like boiling, steaming, frying, roasting, or baking. Boiling results in comparatively greater loss of nutrients, particularly when the water is discarded as in the case of rice or some vegetables, thus losing the water-soluble vitamins. Steaming vegetables prevents the loss of nutrients. If root vegetables such as potato are boiled along with their skin the loss of nutrients is less.

Ordinary cooking causes little loss of protein, fat and carbohydrate in cereals, pulses and meats. Vegetables do lose some protein when they are boiled in water, particularly when salt is used in cooking and the water thrown away. Boiling milk makes it safer by destroying the bacteria. It also softens the proteins, making them easier to digest, particularly in the case of young infants. Vitamin C, however, is destroyed by boiling. Exposure to light also destroys riboflavin and vitamin C.

The addition of certain substances while cooking also affects the loss of nutrients. If soda is added to the food it facilitates cooking and preserves the colour but destroys most of the thiamine. On the other hand, a highly acidic substance like tamarind preserves vitamins.

The longer the food is cooked, the greater is the loss of nutrients, particularly thiamine and vitamin C. If food is cooked in a small quantity of water which is not discarded, the loss is not significant. If more water is added, it should not be thrown away but should be used in *dal*, soup or gravy. This water also contains minerals like sodium and potassium. Cooking with the lid on preserves vitamin C. Steaming food preserves the nutrients. For those who can afford one, a pressure cooker is invaluable because it preserves the food value and saves a lot of time and fuel.

Cutting and Trimming

Vegetables should be washed and *then* peeled, and not cut too small in order to minimise nutrient loss while cooking. If they are soaked in water nutrient losses can occur. The finer the vegetable is cut, the greater is the loss of nutrients. Removing the leaves

from vegetables also removes a good source of carotene. As far as possible, leaves of radish and turnip and the outer leaves of cabbage should be used.

Sprouting

Sprouted legumes are common in many parts of India and are eaten lightly cooked or even raw in salads. Sprouting improves the nutrient value and digestibility of legumes and some toxins are destroyed. Vitamin C and riboflavin are synthesised, but cooking destroys much of the vitamin C.

Malting

Malting breaks down the starch in the grain into sugar. The grain is dampened to allow it to germinate, then it is dried, dehusked and milled. The malting process increases the content of riboflavin, niacin and iron. Gruel made from malted flour is less thick because of the presence of amylase and more flour can be used to make gruel as compared to ordinary flour. This increases the energy density of food which is very important in feeding young children.

Fermentation

This increases digestibility and adds a distinctive flavour to the food. A commonly used fermented item of food is curd which is eaten in all parts of India and is considered more digestible than milk during intestinal disorders. The *dal* and rice mixture used to make *idli* and *dosa* is also slightly fermented. In north India, *khamiri roti* is popular. This is made from a mixture of fresh and fermented dough. In Gujarat, *dhokla* is a popular food which is a mixture of red gram *dal* and rice which is steamed after fermentation. Fermentation involves the growth of micro-organisms which improve the nutritional value of the food.

Drying

Fish is commonly dried in the coastal areas and is an excellent source of protein and calcium. Seasonal vegetables are also dried by housewives, but the methods used involve the loss of much of their flavour and nutrients. These are particularly reduced if the foods are first plunged into boiling water and then dried in the shade.

Milling

Hand pounding is being replaced by milling even in the rural areas. Milling is a labour-saving process which makes cereals edible. While it improves digestibility by removing the fibre, quite a lot of the nutrients are also unfortunately lost—for instance, thiamine and niacin, and some riboflavin, calcium, iron and protein.

Wheat is converted into coarse and fine flour (*atta* and *maida*). *Atta* is used to make *chapatis*, while *maida* is used to bake bread, make sweets, *puris*, *nans*, etc. The advantages of *maida* are that it is whiter, it has less phytic acid, has a finer texture and is better absorbed by the body. The disadvantages are that greater amounts of vitamin B, calcium and iron are lost, as a result of which *atta* is preferable to *maida*.

Parboiling

This is a process in which rice is first soaked in water, then steamed and dried. This drives the nutrients into the interior of the grain and subsequent milling does not destroy as much vitamin B and minerals. Parboiled rice is more resistant to insects and fungus. The disadvantage is that it has a peculiar smell which may be due to poor attention while processing. The grain also does not appear as soft and smooth as the grain of non-parboiled rice. Parboiled rice is eaten a great deal in southern India and in Bengal. *Khesari*

dal can also be parboiled to destroy the toxins which cause lathyrism resulting in paralysis. Parboiling is a traditional process that enhances the nutritional value of food and should be encouraged.

Storage

Food can become infested with insects as a result of improper storage. This happens particularly during the monsoons when humidity is very high. Rats also prove to be a menace. In India, 8 per cent of all the grain stored is destroyed by rats. Dampness can lead to fungus contamination which can be very toxic to the body. Some years ago there was an epidemic of liver disease and jaundice in Gujarat and Rajasthan, caused by eating maize contaminated with the fungus aflatoxin. This fungus can also contaminate rice and groundnut. Articles of food should be dried in the sun and then stored in moisture-proof containers or bags and kept in a dry area. If pesticides are added to stored grain, it should be washed well before use, or else can prove fatal.

Ten steps to successful breastfeeding

Every facility providing maternity services and care for newborn infants should:

1. **Have a written breastfeeding policy that is routinely communicated to all health care staff.**
2. **Train all health care staff in skills necessary to implement this policy.**
3. **Inform all pregnant women about the benefits and management of breastfeeding.**
4. **Help mothers initiate breastfeeding within half-hour of birth.**
5. **Show mothers how to breastfeed, and how to maintain lactation even if they should be separate from their infants.**
6. **Give newborn infants no food or drink other than breastmilk, unless medically indicated.**
7. **Practise rooming-in—allow mothers and infants to remain together—24 hours a day.**
8. **Encourage breastfeeding on demand.**
9. **Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.**
10. **Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.**

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